Technics

Frequency Generator Servo
Automatic Turntable System

SL-220 / SL-221

Operating instructions

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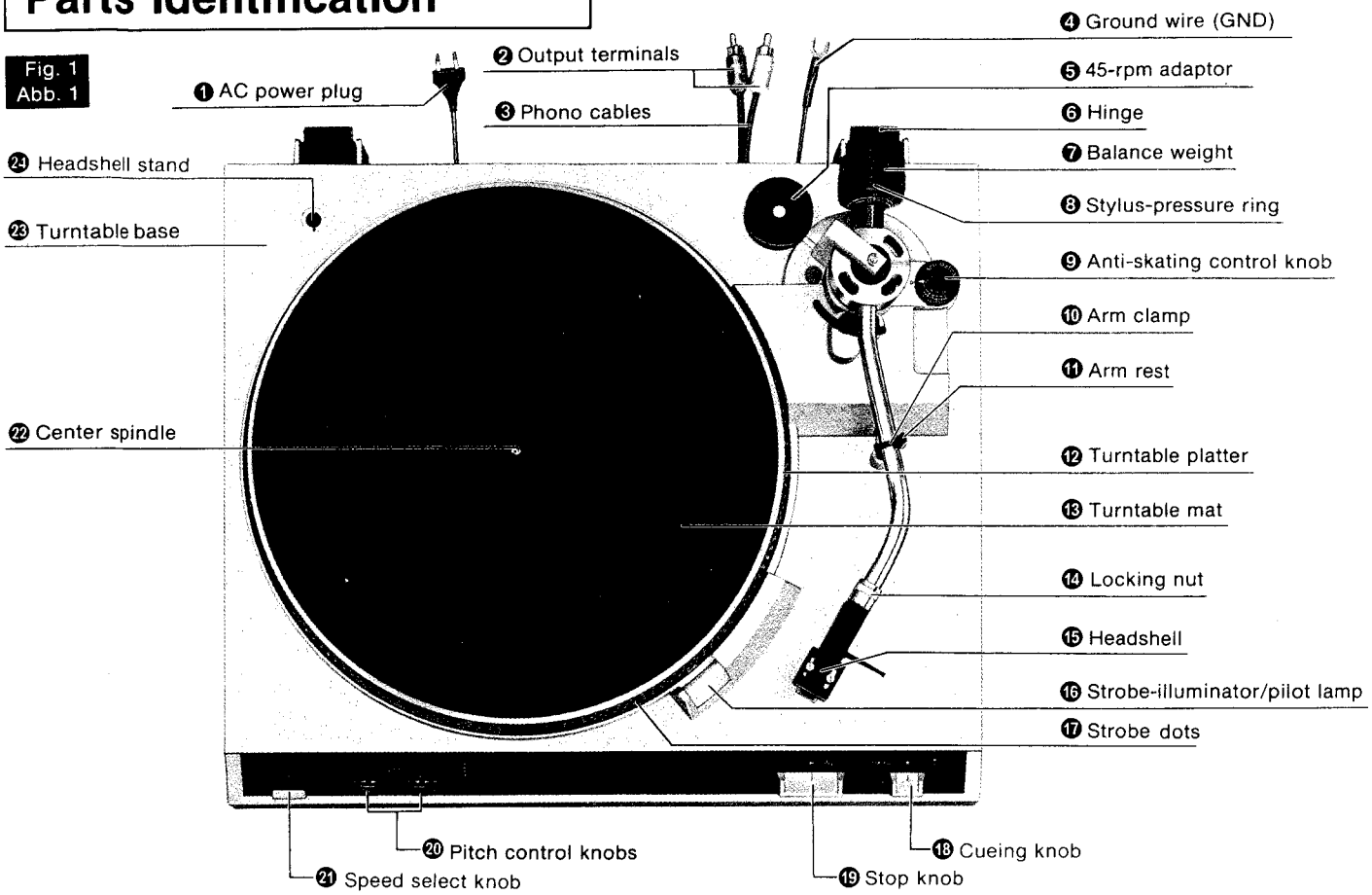
Parts identification

Fig. 1
Abb. 1



We want to thank you for selecting the SL-220/SL-221.
For optimum performance, we recommend that you read these instructions carefully.

These operating instructions cover both SL-220 and SL-221.

Before use

Caution:
Never connect the AC power plug before assembly has been completed.
Attach the dust cover last, so that assembly and adjustments can be made most conveniently.

The operating instructions are commonly applicable to sets with cartridge and without cartridge, and also to those of different colors, so please refer to the following notes for further information.
For sets without cartridge, the cartridge section of the specifications may be ignored.

❶ Checklist of parts

Turntable unit 1
Turntable platter 1
Turntable mat 1
Dust cover 1
45-rpm adaptor 1
Balance weight 1
Headshell 1
(Overhang gauge 1
(for the unit without cartridge))

Assembly and set-up

❶ Installation of the turntable platter

1. Place the turntable platter on the center spindle.
2. Attach the belt to the capstan using the ribbon as shown in the picture. **(See Fig. 2.)**
   And then, remove the ribbon.
3. Place the turntable mat on the platter.

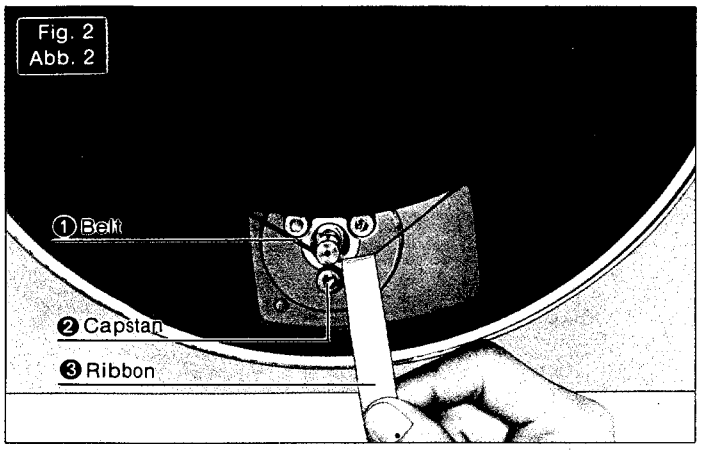


Fig. 2
Abb. 2
1 Belt
2 Capstan
3 Ribbon

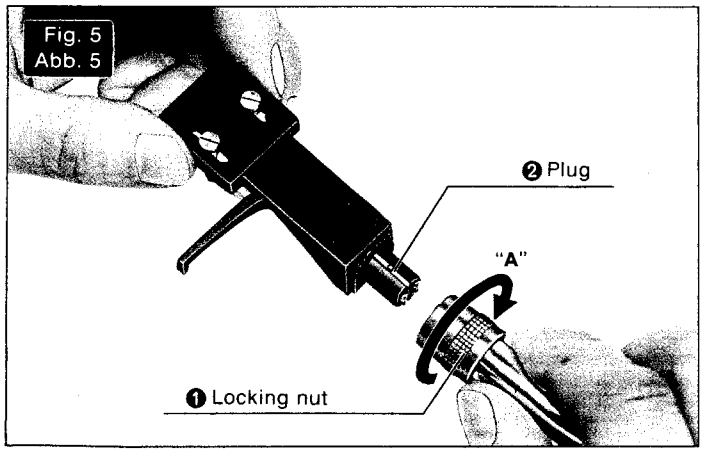


Fig. 5
Abb. 5
2 Plug
"A"
1 Locking nut

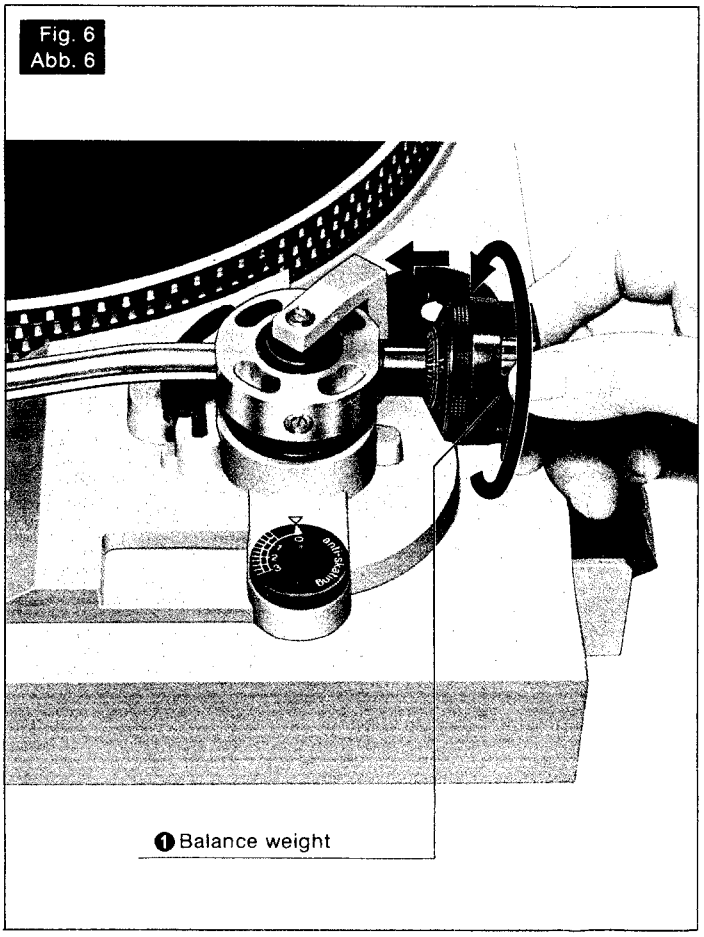


Fig. 6
Abb. 6
1 Balance weight

Fig. 7
Abb. 7

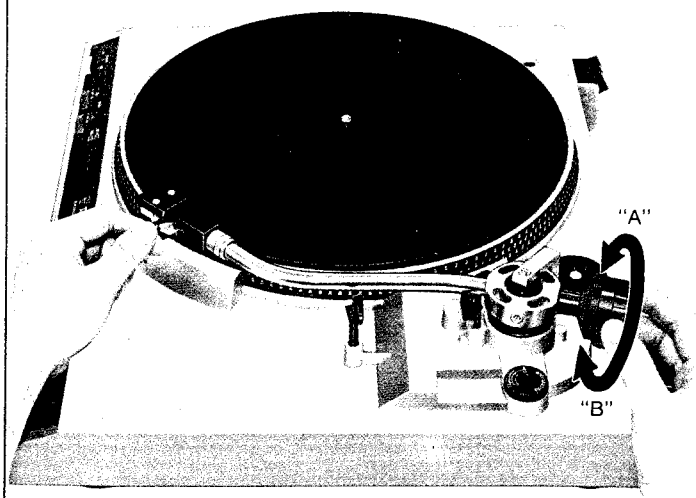


Fig. 8
Abb. 8

❶ Horizontally balanced state

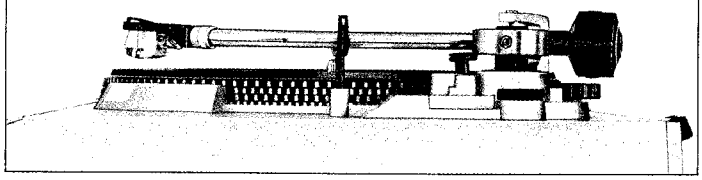


Fig. 9
Abb. 9

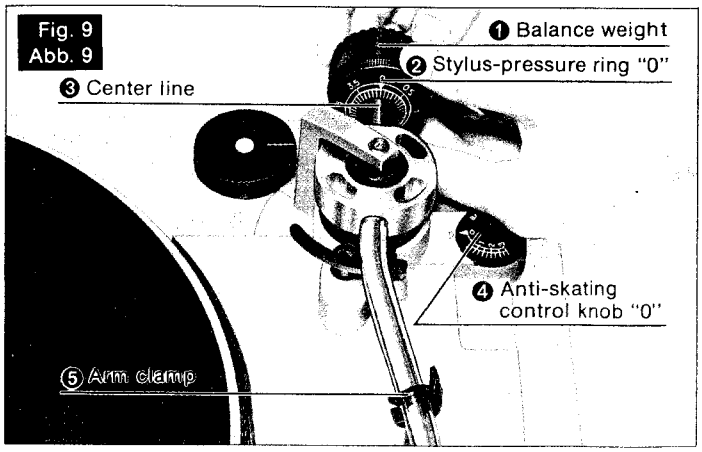


Fig. 10
Abb. 10

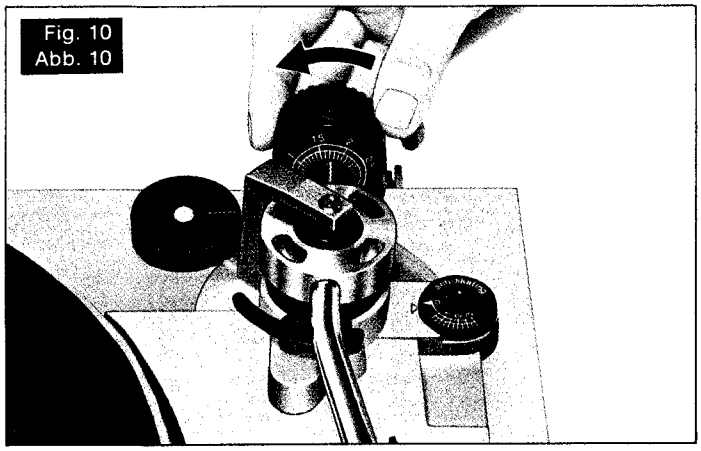


Fig. 11
Abb. 11

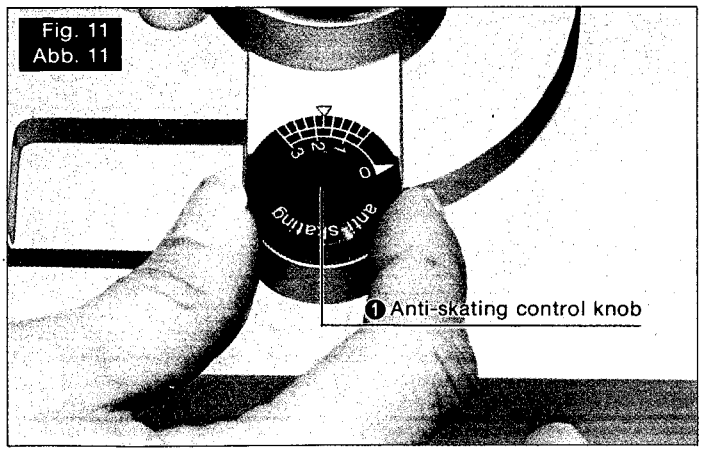


Fig. 12
Abb. 12

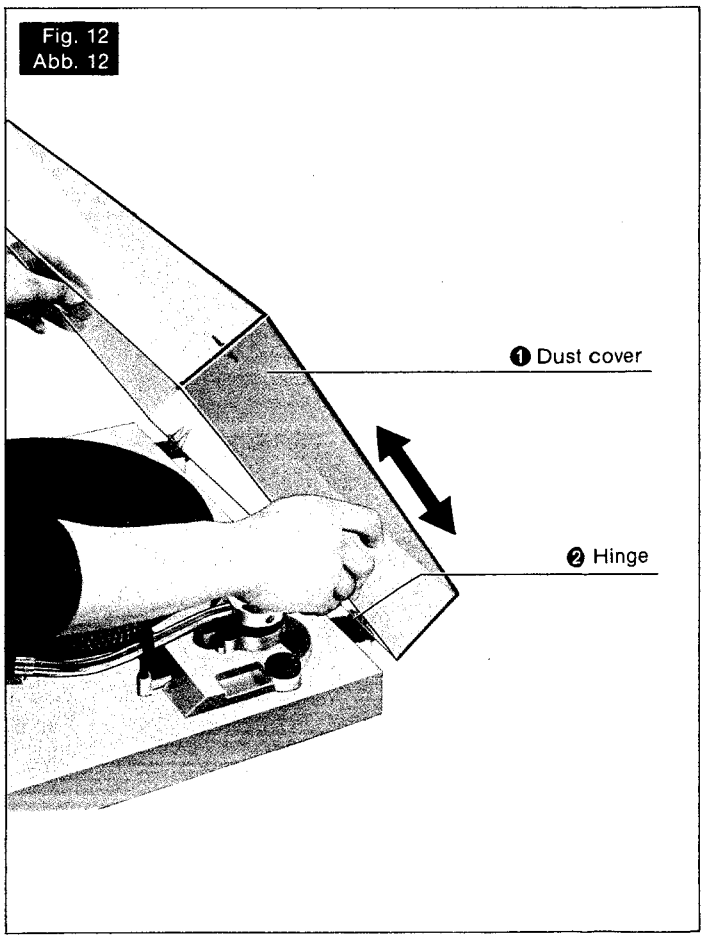
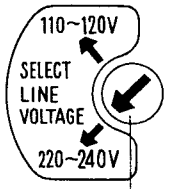


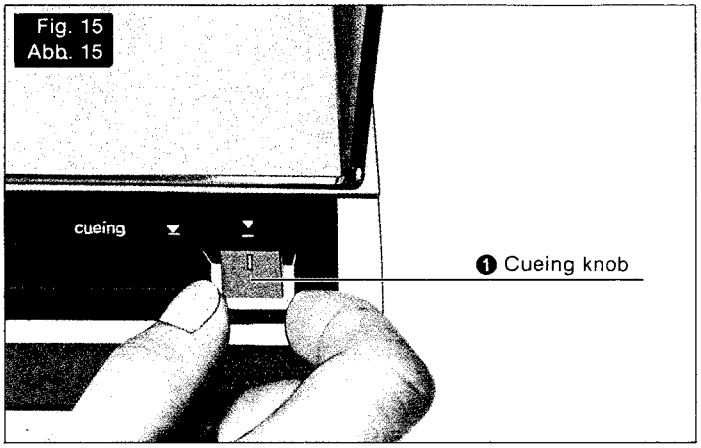
Fig. 13
Abb. 13



❶ AC line-voltage selector

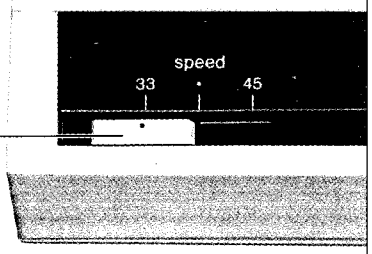
The AC line-voltage selector is located at the bottom base.

Fig. 15
Abb. 15



❶ Cueing knob

Fig. 14
Abb. 14



❶ Speed select knob

Fig. 16
Abb. 16

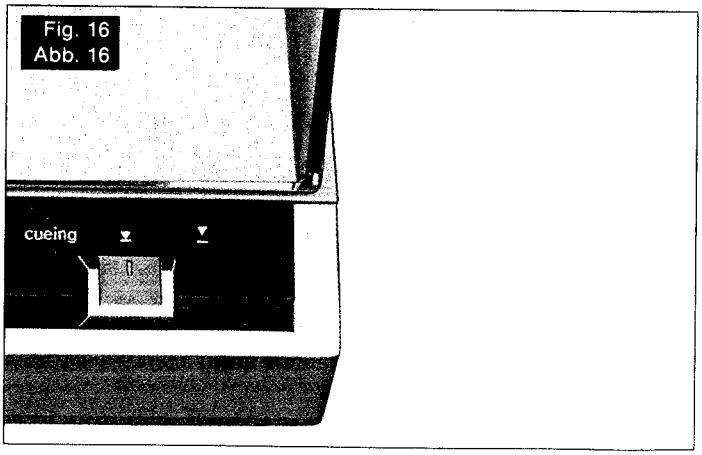


Fig. 17
Abb. 17

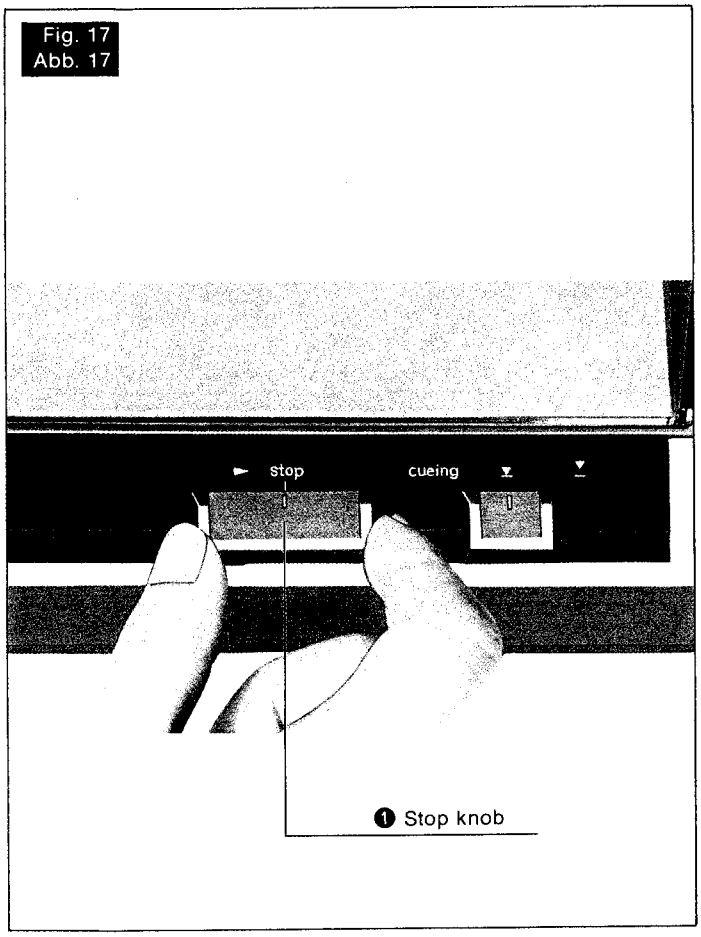


Fig. 18
Abb. 18

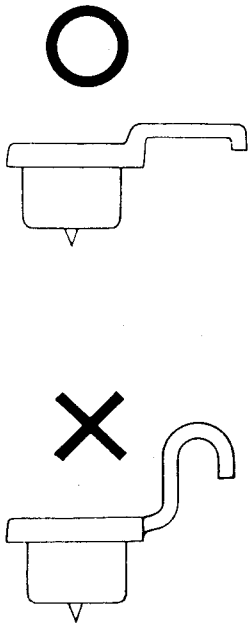


Fig. 19
Abb. 19

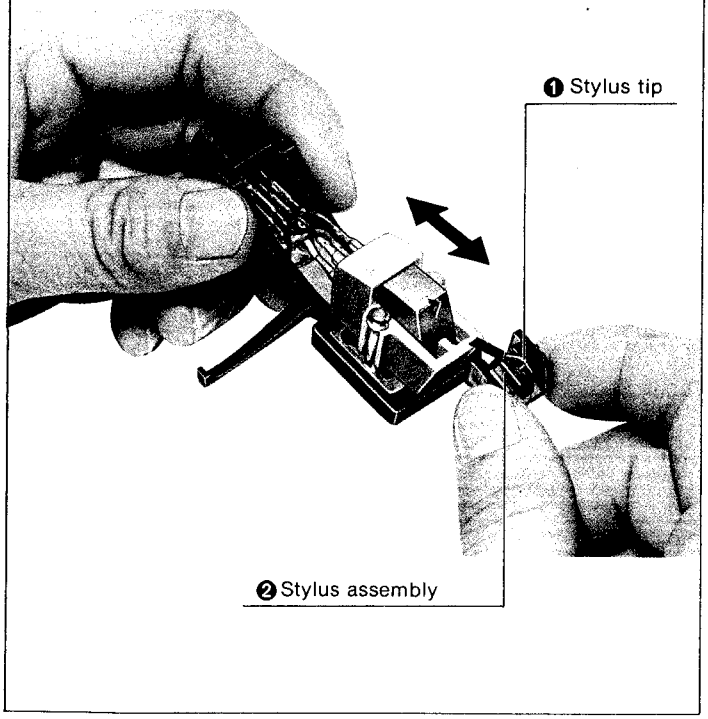


Fig. 20
Abb. 20

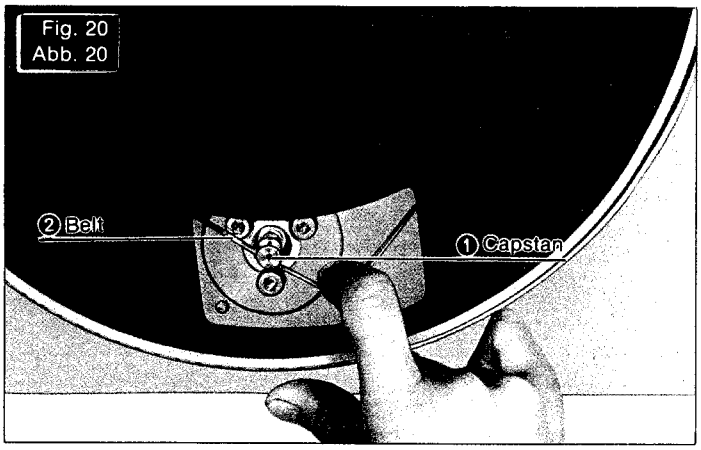


Fig. 21
Abb. 21

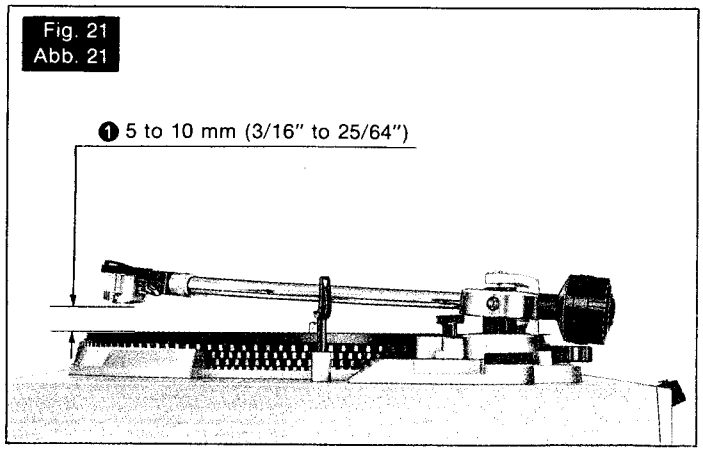
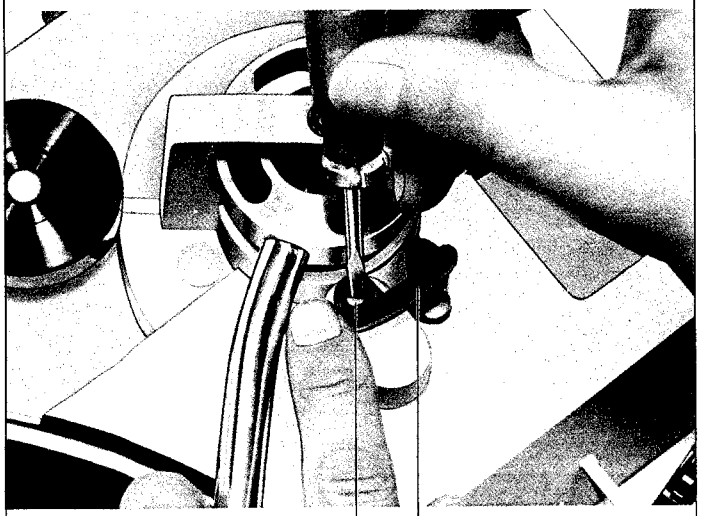


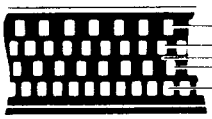
Fig. 22
Abb. 22



❶ Arm-lift bar

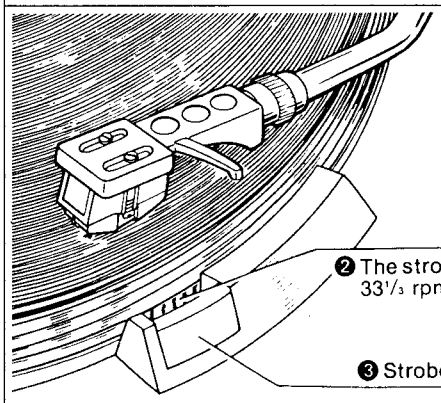
❷ Arm-lift adjustment screw

Fig. 23
Abb. 23



45 rpm
33⅓ rpm — 50Hz

45 rpm
33⅓ rpm — 60Hz



❶ Strobe dots

❷ The strobe dots for 60 Hz, 33⅓ rpm seem to be stationary.

❸ Strobe-illuminator/pilot lamp.

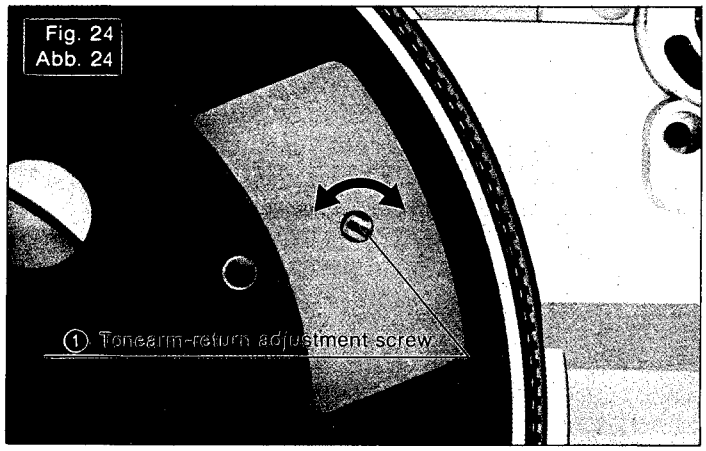


Fig. 24
Abb. 24
① Tonearm-return adjustment screw

❷ Installation of the cartridge (for set without cartridge)

1. Connect the lead wires to the cartridge terminals.
   The terminals of most cartridges are color coded.
   Connect each lead wire to the terminal of the same color.
   White (L +) . . . . . Left channel (+)
   Blue (L–) . . . . . Left channel (–)
   Red (R +) . . . . . Right channel (+)
   Green (R–) . . . . . Right channel (–)
2. Install a cartridge to the headshell, and tighten it with screws provided with the cartridge. **(See Fig. 3.)**

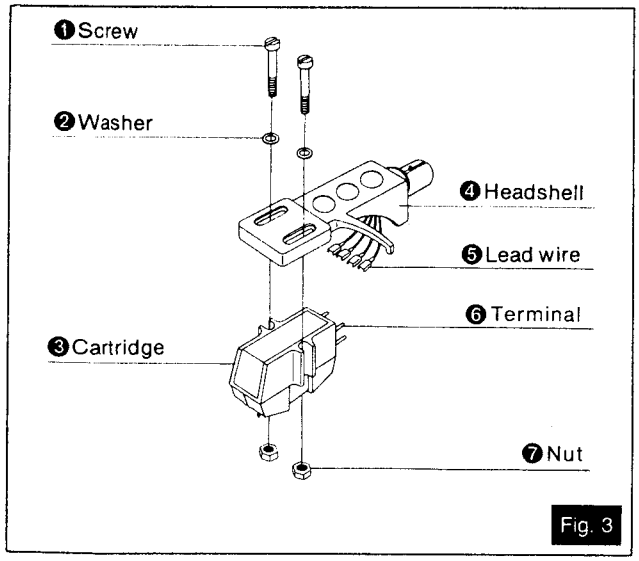


Fig. 3

Adjustment of overhang

A) For the unit with overhang gauge

1. Insert the headshell into the gauge. **(See Fig. 4-1.)**
2. Loosen the mounting screws and move the cartridge forward or backward until the stylus tip lines up with the edge of the gauge.
3. Tighten the screws without moving the cartridge.

Note:

- Your cartridge is now adjusted for lowest tracking error and minimum distortion.
- This gauge is exclusively designed for this tonearm.

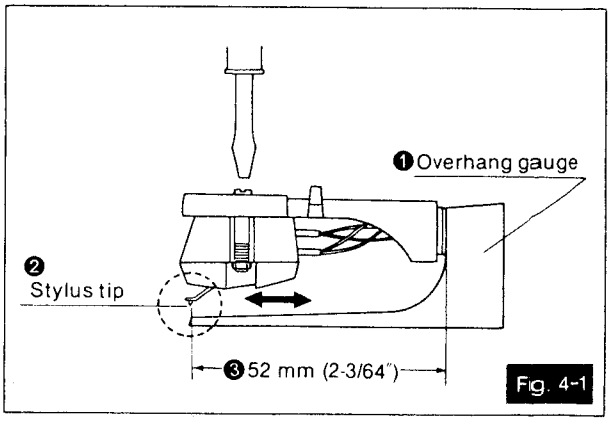


Fig. 4-1

B) For the unit without overhang gauge

- The overhang of this unit is 15 mm.
- Loosen the screws and move the cartridge forward or backward until the distance between the stylus tip and the plug becomes 52 mm (2-3/64") as shown in the picture. **(See Fig. 4-2.)**
- Tighten the screws without moving the cartridge.

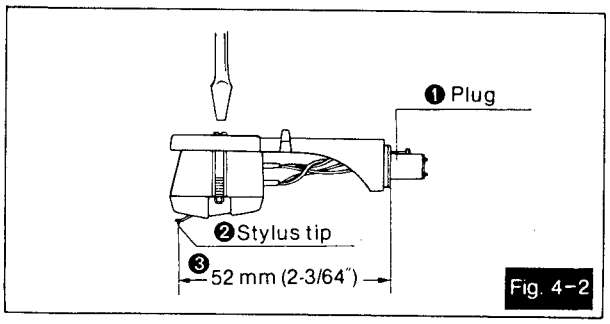


Fig. 4-2

❸ Installation of the headshell/cartridge assembly (See Fig. 5.)

Insert the headshell/cartridge assembly into the front end of the tubular arm, and turn the locking nut clockwise (in the direction shown by the arrow "A"), with the headshell/cartridge assembly firmly held horizontally.

❹ Installation of the balance weight (See Fig. 6.)

Place the balance weight on the rear shaft of the tonearm.

❺ Adjustments of horizontal zero ("0") balance and stylus pressure

1. Remove the stylus protector, if your cartridge has a detachable one. Be careful not to touch your fingers to the stylus tip.
2. Release the arm clamp and lift the tonearm from the arm rest to free it.

Note:

- When you move the tonearm toward the center spindle, the turntable platter will move slightly, even if the speed select knob is at the "•" position, but this movement is not significant.
- If the tonearm pulls toward the arm rest when the tonearm is held in a free state as shown in the picture **(See Fig. 7)**, rotate the turntable platter clockwise about 10 times. This will disengage the automatic mechanism from the tonearm gear, which in rare cases may have moved out of its normal position during transportation.

3. Turn the entire balance weight clockwise (indicated by the arrow **"A"**) or counterclockwise (indicated by the arrow **"B"**) until the tonearm is approximately balanced horizontally (floats freely). **(See Figs. 7 and 8.)**

Note:

- During the adjustment of the horizontal "0" balance, be careful that the stylus tip of the cartridge does not contact the turntable mat or turntable base.

4. After the tonearm is horizontally "0" balanced, temporarily refasten the tonearm with the arm clamp.

5. Hold the balance weight stationary with one hand, as shown in the picture, and rotate only the stylus-pressure ring to bring the numeral "0" of the ring into alignment with the center line of the tonearm rear shaft. The adjustment of the horizontal "0" balance is now completed. **(See Fig. 9.)**

6. After adjusting the horizontal "0" balance, turn the balance weight clockwise in the direction of the arrow and align to the correct stylus pressure. (Follow the cartridge manufacturer's recommendation.) **(See Fig. 10.)**

- As the stylus-pressure ring moves in step with the balance weight, proper stylus pressure can be selected by directly reading the graduated ring.

Note:

- Set the stylus pressure to the maximum recommended value for your cartridge in cases where the record has an extremely high recording level, or where the unit is operated in a room at low temperature,or in places in which the unit is subjected to vibrations.

❻ Adjustment of the anti-skating control

Set the anti-skating control knob to the same value as the stylus pressure. **(See Fig. 11.)**

Note:

- When a cartridge with integral dust brush is used, follow the cartridge manufacturer's recommendation for adjusting both stylus pressure and anti-skating force.

❼ Installation of the dust cover

Place the dust cover into position from directly above, holding it at both sides. For detaching the dust cover, be certain first to raise it as illustrated before removal. **(See Fig. 12.)**

Note:

- Opening or closing of the dust cover during play should be avoided. This may not only cause undesired vibrations, but also result in skipping of the stylus.
- If you must open the dust cover during play, do so as gently as possible.

❽ Placement

1. Place the unit in a stable and horizontal position, where there is little or no vibration.
2. Locate the unit as far away from the speakers as possible and isolate the unit from sound radiation from them.
3. Do not place the unit where it is exposed to direct sun, dust, moisture or heat.
4. Keep it in a well ventilated place.

❾Connections

Note:

AC line-voltage selector (See Fig. 13.)

Make sure that the turntable's AC line-voltage selector is matched to your voltage before connecting the AC power plug.

Never connect to a DC socket.

If the pre-selected voltage is different from your local voltage, turn the AC line-voltage selector with a screwdriver so that it corresponds with your local voltage.

The AC line-voltage selector is located at the bottom base.

1. **Connect the AC power plug.**

   Connect the AC power plug to an AC wall socket.

2. **Connect the output terminals.**

Output terminals		Amplifier or Receiver
L(White)	→	L Channel
R (Red)	→	R Channel
GND (Spade lug)	→	GND

Note:

Be sure to connect the ground terminal firmly to the amplifier or receiver. If this connection is not made or is loose, a power source "HUM" will result.

How to operate

❶ **Place a record on the turntable mat.**

❷ **Set the speed select knob to the desired record speed. (See Fig. 14.)**

❸ **Remove the stylus protector, if your cartridge has a detachable one.**

❹ **Release the arm clamp.**

❺ **Set the cueing knob to the "▼" position. (See Fig. 15.)**

❻ **Move the tonearm over the desired groove.**

❼ **Set the cueing knob to the "▼" position. (See Fig. 16.)**

The tonearm will descend slowly onto the record and play will begin.

❽ **When play has finished, the tonearm will automatically return to the arm rest (auto-return) and the turntable platter will stop rotation.**

(The turntable platter will continue to rotate briefly due to its own inertia.)

Note:

- After play is completed, fasten the tonearm with the arm clamp and set the speed select knob to the "•" position.
- Attach the stylus protector again, if you have one, to protect the stylus tip from damage.

■ When you play a 45-rpm record with a large center hole

Place the 45-rpm adaptor on the center spindle. Set the speed select knob the "45" position.

■ How to suspend play

Set the cueing knob to the "▼" position.
The stylus tip of the cartridge will be lifted from the record.

■ How to stop play

Set the stop knob to the "stop" position. **(See Fig. 17.)**
The tonearm will automatically return to the arm rest and the turntable will stop rotating.

Notes and Maintenance

❶ Do not grasp or hold the tonearm during opration of the automatic-return mechanism.

❷ When you use other headshells, check the headshell configuration for compatibility. (See Fig. 18.)
When other types of headshells are employed, the handle portion of the headshell may strike against the inner, upper surface of the dust cover during automatic motion of the tonearm. In such case we recommend the dust cover be left open during play.

❸ Before detaching or attaching the headshell, be sure to turn the power of the amplifier or receiver off.

Noise produced by detaching or attaching of the headshell, with the volume control turned up, may cause damage to the speakers.

❹ When play is finished, be sure to secure the tonearm with the arm clamp.
After play is finished, if the unit is not to be used for some time, care should be taken to secure the tonearm to protect the stylus tip.

For the same reason, the stylus protector should also be attached.

❺ Wipe the headshell terminals from time to time.
Dust and dirt at the headshell terminals may result in increased "HUM" noise or intermittent sound. Use a soft dry cloth to clean the headshell terminals.

❻ Wipe the dust cover and turntable base with a soft, dry cloth.

- Never use any cleaners containing alcohol, benzine or thinner.
- Use of a chemically treated dust cloth should also be avoided. Be sure that the dust cover is not exposed to insecticide spray.
- To remove stubborn finger prints or grease spots, detach the dust cover and disconnect the AC power plug.
  Use a soft cloth slightly moistened with a mild soap and water solution.
- Do not wipe the dust cover during play, or the tonearm may be attracted toward the dust cover due to the generation of static electricity.

❼ Dust and dirt should be carefully removed from stylus tip or records.
Dust and dirt on stylus tip or record may not only result in deterioration of tone quality, but cause undue wear of the record and the stylus tip itself.
Special stylus tip brushes and record cleaners can be purchased in most electronic supply houses.

❽ Replacement of the stylus (for set with cartridge)

The unit is furnished with a diamond stylus.
The life of the stylus differs depending on the conditions of use, but it is recommended that you replace the stylus at the first sign of wear. About 1000 hours of use is an approximate standard.

The replacement stylus for the unit is the EPS-270SD.

1. Remove the headshell/cartridge from the tubular arm. Hold the stylus assembly with your fingers and withdraw it slantwise, as shown in the picture. **(See Fig. 19.)**
2. Align the new stylus assembly with the square opening of the cartridge main body, and push it into the opening positively as far as it will go.

❾ How to remove and install the turntable platter (See Fig. 20.)

The belt is connected to the capstan and the inner drive rim of the turntable platter.

Before removing the turntable platter, release the belt from the capstan.

When reinstalling the turntable platter, lower it over the turntable shaft and then put the belt onto the capstan.

Note:

- Be careful not to let oil or grease contact the belt. If grease inadvertently contacts the belt, disconnect the AC power cord first and wipe the belt clean with alcohol.

Adjustments

❶ Adjustment of arm-lift height (See Figs. 21 and 22.)

- The arm-lift height distance between the stylus tip and record surface when cueing knob is at "▼" has been adjusted at the factory before shipping to approximately 5 to 10 mm.
- For using different cartridges available on the market or when further adjustments are particularly necessary, make adjustment as follows:

1. Put on the stylus protector to protect the stylus tip from damage.
2. Set the speed select knob to the "•" position to prevent the turntable platter from rotation.
3. Move the tonearm toward the center spindle.
4. Turn the adjustment screw clockwise or counterclockwise, while pushing the arm lift down. **(See Fig. 22.)**

Clockwise rotation

— distance between the record and stylus tip is reduced.

Counterclockwise rotation

— distance between the record and stylus tip is increased.

Note:

- As the adjusting screw has a hexagonal head, be sure to make the adjustment while depressing the arm lift, or the screw will not move freely. Also be sure that the hexagonal head retracts correctly into the arm lift when the latter is released.

❷ Speed adjustment (with pitch control knobs) (See Fig. 23.)

Strobe dots are set on the rim of the turntable platter according to the power-time frequency and the number of revolutions of the records. Make adjustment, referring to strobe-dot indication. **(See Fig. 23.)**

1. Place a record on the turntable mat.
2. Set the speed select knob to the speed to be adjusted.

3. Adjust the speed while playing a record.
   The strobe-illuminator/pilot lamp will be lit for illuminating the strobe dots.
4. While turning the pitch control knobs either to "+" side or "-" side, adjust so that the strobe dots of the turntable platter look as if they were stationary. The state under which the strobe dots seem to be stationary represents the correct number of revolutions.

   " + " direction
   This increases the speed of the turntable rotation, and the strobe dot pattern seems to flow in the same direction as the rotational direction of the turntable platter.
   "–" direction
   This decrease the speed of the turntable rotation, resulting in a state opposite to that in the " + " direction.
   Note:
   Strobe dot pattern
   The strobe-illuminator/pilot lamp of this unit employs the commercially available power source. The frequency of such power source, when actually measured, has a fluctuation of about 0.2%. As such a fluctuation of the power source affects the strobe illuminator, the strobe dot pattern also seems to fluctuate to a certain extent.
   But the unit is not affected by these fluctuations of the power source, since a DC motor is employed. In other words, rotation of the platter will be constant, and slight shifts in the movement of the dots simply reflect normal drift in the power-source frequency.

❸ Adjustment for automatic return position (See Fig. 24.)

(Remove the turntable mat.)
In cases where the tonearm tends to return before playing has finished.
—Rotate clockwise.
In cases where the tonearm fails to return after the last groove of the record.
—Rotate counterclockwise.

Features

❶ New type frequency generator servo control

One of the major secrets behind the razor-sharp accuracy and superb quality of sound lies in the new type (Frequency Generator) servo controlled DC motor, and greatly improved highly reliable IC circuitry. Even the slightest hint of speed change and drift is corrected immediately.

❷ Electronic speed switching

Even though this turntable is belt-driven, gone is the old conventional pulley type speed changing mechanism. Speed switching in this unit is fully electronic, thereby adding to the high degree of mechanical precision and reliability.

❸ All front-panel controls

The advancement to complete front-panel control marks a big step forward in turntable operation, not only because of the greater convenience, but also because of the greater protection from dust, as the dust cover can stay closed.

❹ Tonearm cueing controlled from front panel

The tonearm is raised and lowered softly by a viscous-damped cueing lifter. Even with the dust cover closed, a cueing can be easily performed as the control is located on the front panel.

❺ Automatic Tonearm Return

For greater operational convenience, the tonearm returns to the arm rest automatically.

❻ Highly sensitive gimbal suspension system

With the high-precision pivot bearings employed for the horizontal and vertical journals of the tonearm, in concert with the adoption of the gimbal suspension system, a high-sensitivity arm of less than 7 mg friction has been attained, thus making it possible to fully realize the performance of high-compliance cartridges.

❼ Independent pitch controls

Permits record speed (at both $33^{1}/_{3}$ and 45 rpm) to be varied by up to 6%.

❽ Precision strobe-illuminator/pilot lamp

With the built-in strobe illuminator/pilot lamp, accurate speed adjustments can be made rapidly and easily.

❾ Anti-skating force mechanism

The well-designed anti-skating force mechanism ensures minimum side thrust with different cartridges and guarantees accurate center-of-the-groove tracking.

❿ Detachable dust cover

Specifications

General

Power supply:	~110-120/220-240V, 50 or 60 Hz
Power consumption:	3W
Dimensions (W×H×D)	43.0 × 12.6 × 37.5 cm (16-59/64 × 4-31/32 × 14-49/64 inches)
Weight:	4.5 kg (9.9 lb.)

Turntable section

Type:	Frequency Generator Servo Automatic Turntable System (auto-return, auto-stop)
Drive method:	Belt drive
Motor:	Frequency Generator Servo DC motor
Turntable platter:	Aluminum die-cast, 30.4 cm (12")
Turntable speeds:	33-1/3 and 45 rpm
Pitch controls:	Individual adjustment controls, 6% adjustment range
Wow and flutter:	0.045% WRMS (JIS C5521) ±0.06% peak (IEC 98A Weighted)
Rumble:	-70 dB (IEC 98A Weighted)

Tonearm section

Type:	Universal tubular arm, static-balanced type
Effective length:	230 mm (9-1/16")
Overhang:	15 mm (19/32")
Friction:	Within 7 mg (horizontally and vertically)
Effective mass:	13 g (without cartridge)
Tracking error angle:	Within 2°32' (at the outer groove of 30 cm (12") record) Within 0°32' (at the inner groove of 30 cm (12") record
Offset angle:	22°
Adjustable stylus pressure range:	0 to 3 g (stylus pressure direct reading type)
Cartridge weight range:	5.5 to 8.5 g 14.5 to 17.5 g (including headshell)
Headshell weight:	9 g

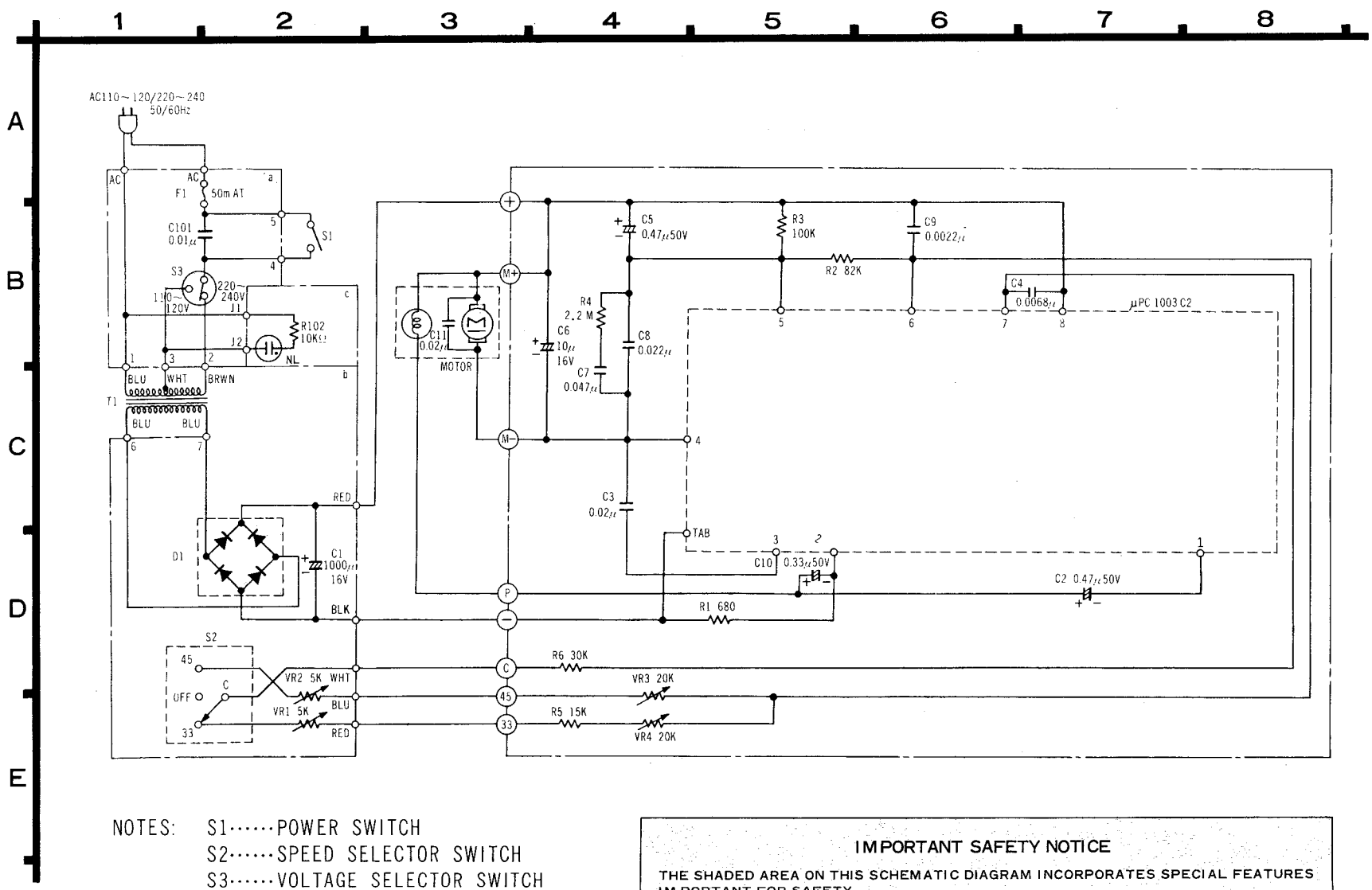
Cartridge section (for set with cartridge)

Model No.:	EPC-270C
Type:	Moving magnet
Frequency response:	20 Hz to 25 kHz -3 dB 20 Hz to 15 kHz ±2 dB
Output voltage:	3.2 mV at 1 kHz 5 cm/sec. zero to peak lateral velocity (6.4 mV at 1 kHz, 10 cm/sec. zero to peak lateral velocity [DIN 45500])
Channel separation:	25 dB at 1kHz
Channel balance:	Within 2 dB at 1 kHz
Compliance (dynamic):	10×10^{-6} cm/dyne at 100 Hz (CBS STR-100)
Stylus pressure:	1.75 ±0.25 g (17.5 ±2.5mN
Load impedance:	47 kΩ to 100 kΩ
Weight:	6.0 g (cartridge only)
Replacement stylus:	EPS-270SD

Specifications subject to change without notice.

Schematic diagram

This schematic diagram may be modified at any time with the development of new technology.



NOTES: S1·····POWER SWITCH
S2·····SPEED SELECTOR SWITCH
S3·····VOLTAGE SELECTOR SWITCH

IMPORTANT SAFETY NOTICE

THE SHADED AREA ON THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IM PORTANT FOR SAFETY.
WHEN SERVICING IT IS ESSENTIAL THAT ONLY M ANUFACTUR'S SPECIFIED PARTS BE USDE FOR THE CRITICAL COM PONENTS IN THE SHADED AREAS OF THE SCHEM ATIC.